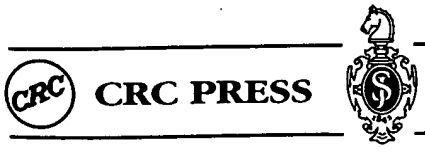
Appendix B

This Appendix to the AMENDMENT includes selected pages from the *Comprehensive Dictionary of Electrical Engineering* (CRC Press LLC 1999), including pages 297, 417 and 504 thereof.

COMPREHENSIVE DICTIONARY OF ELECTRICAL ENGINEERING

EDITOR-IN-CHIEF
Phillip A. Laplante



A CRC Handbook Published in Cooperation with IEEE Press

Acquiring Editor: *Ron Powers*
Production Manager: *Suzanne Lassandro*
Project Editor: *Susan Fox*
Cover Design: *Jonathan Pennell*

Library of Congress Cataloging-in-Publication Data

Comprehensive dictionary of electrical engineering / Phillip Laplante, editor-in-chief.
p. cm.
Includes bibliographical references (p.).
ISBN 0-8493-3128-5 (alk. paper)
ISBN 3-540-64835-6 (alk. paper)
1. Electric engineering — Dictionaries. I. Laplante, Phillip A.
TK9.C575 1999
621.3'03—dc21 98-44776
CIP

Co-published by
CRC Press LLC
2000 Corporate Blvd., N.W.
Boca Raton, FL 33431, U.S.A
(Orders from the U.S.A. and Canada (only) to CRC Press LLC)

and by
Springer-Verlag GmbH & Co. KG
Tiergartenstraße 17
D-69121 Heidelberg
Germany
(Orders from outside the U.S.A. and Canada to Springer-Verlag)

ISBN 3-540-64835-6

International Standard Book Number 3-540-64612-4
Library of Congress Card Number 98-44776
Printed in the United States of America 1 2 3 4 5 6 7 8 9 0
Printed on acid-free paper

H

H *See* horizontal.

H_∞ design a group of robust controller design methods based on the methodology of the Hardy space H_∞ consisting of all complex-valued functions of complex variable that are analytic and bounded in the open right half-plane. The least bound that may be imposed on this function is its H_∞ norm. Since the open right half-plane may be replaced by the imaginary axis $j\omega$, H_∞ methods provide a direct generalization of the classical frequency domain approach to control system design.

A standard problem is to design a controller that ensures the internal stability of the closed-loop system and minimizes the H_∞ norm of the transfer function between the inputs (reference signals, disturbances) and errors. Since this transfer function is equal to the sensitivity function, such design results in optimal sensitivity. The standard problem is then transformed into an equivalent model-matching problem with a fixed, possibly unstable transfer function derived from the plant and a "free parameter" stable compensator to be chosen. The compensator is found by minimization of the supremum over all frequencies of the modeling error. Finally, an optimal (or suboptimal) controller is synthesized based on the found optimal (or suboptimal) solution to the model-matching problem. To meet specific dynamic objectives the transfer functions are modified by pre- and postfilters in the form of frequency dependent weighting functions. Although the primary problem is formulated in frequency domain, it may be solved both by input–output and state space techniques. In the former case the algorithms are based on spectral and inner–outer factorizations and approximation theorems for complex functions. In the latter case the problem may be attacked by linear-quadratic game theoretic approach resulting in a set of Riccati equations. H_∞ (H infinity) methods may be used in robust stabilization, robust performance design, disturbance attenuation, optimal tracking, model following, optimal sensitivity design, etc.

H infinity design *See* H_∞ design.

H modes the wave solutions with zero electric field component in the direction of propagation. Also known as transverse electric (TE) modes.

H parameters characterizes a microwave network with an arbitrary number of ports by relating the total voltages and currents at the ports.

H-D curve *See* Hurter-Driffield curve.

H-mode *See* tranverse electric wave.

H-plane in measuring an antenna's radiation pattern, the plane that is perpendicular to the current in the element and therefore contains the magnetic field intensity vector field. This plane is perpendicular to the electric field (E) plane cut.

H-plane sectoral horn a horn antenna where the aperture is formed by flaring the walls in the direction of the H-plane. The electric field (E) plane dimension is left unchanged from that of the waveguide feed.

H-tree a popular clock distribution tree topologically that resembles the H shape. It introduces the least amount of clock skew compared to other distribution topologies.

Haas effect states that the first sound heard will mask subsequent short delay arriving sounds, the combination appearing as a louder source. Also called law of the first wavefront.

0-8493-3128-5/99/$0.00+$.50

mode-locking forcing the modes of a laser oscillator to be equally spaced in frequency and have a fixed phase relationship; sometimes also occurs spontaneously. *See also* longitudinal mode-locking, transverse mode-locking.

model reference control the control scheme in which the controlled system is made to mimic the behavior of a reference model system that possesses ideal behavioral characteristics.

model-based predictive control *See* predictive control.

modeling the process of creating a suitable description that emulates the performance or characteristics of the actual item being modeled, over some portion of the device hyperspace. Modeling involves all or parts of model creation, device characterization, de-embedding, parameter extraction, verification, validation, valuation and documentation. *See also* mathematical modeling, fuzzy modeling.

modem abbreviation for modulator-demodulator. A device containing a modulator and a demodulator. The modulator converts a binary stream into a form suitable for transmission over an analog medium such as telephone wires or (in the case of a wireless modem) air. The demodulator performs the reverse operation, so two modems connected via an analog channel can be used to transfer binary data over the (analog) channel.

modem-FEC coding error control coding (ECC), applied to a digital signal such that feedforward error correction (FEC), can be used in the modem, thus detecting and often correcting transmission errors.

moderator a material contained in a nuclear reactor core which slows down neutrons to thermal energies, primarily by neutron scattering.

MODFET acronym for modulation doped FET. *See* high electron mobility transistor.

modified nodal formulation a modification of the classical nodal formulation which allows any network to be described. The modification consists of adding extra equations and unknowns when an element not normally modeled in classical nodal analysis is encountered.

modified signed-digit computing a computing scheme in which a number is represented by modified signed-digit. This number system offers carry free addition and subtraction. Instead of 0 and 1, numbers are represented by $-1, 0$, and 1 for the same radix 2. If a number is represented by 0 and 1, we may need carry in the addition. However, since the number can be represented by three possibilities -1, 0, and 1, the addition and subtraction can be directly performed without carry following a specific trinary logic truth table for this number system.

modified z-transform a z-transform of signals and systems that contain nonzero deadtime τ in the range

$$0 \leq \tau < T$$

where T is the sampling interval. Modified z-transforms are usually derived from fundamental principles and given as separate columns in z-transform tables for standard functions.

modified-return-to-bias recording *See* magnetic recording code.

modifier an operation that modifies the membership of a fuzzy set. Examples of modifiers are

1. *very* $A = \mu_{con(A)}(u) = (\mu_A(u))^2$ (concentration);

2. *more or less* $A = \mu_{dil(A)}(u) = (\mu_A(u))^{.5}$ (dilatation).

See also fuzzy set, linguistic variable.

modular network a network whose overall

(2) in branching, the act of guessing the likely outcome of a conditional branch decision. Prediction is an important technique for speeding execution in overlapped processor designs. Increasing the depth of the prediction (the number of branch predictions that can be unresolved at any time) increases both the complexity and speed.

predictive coding quantization, coding, and transmission of the difference between the current data sample and a predicted version of it. Prediction is based on previously transmitted and decoded spatial and/or temporal information.

predictive control control policy (scheme), realized at a given control layer, involving repetitive usage of a decision mechanism based upon considering, at each intervention instant, the future operation of the controlled process (or the control system as a whole) over specified period of time (prediction interval). Usually, predictive control involves the use of optimization-based decision tools and of the free input forecasting; predictive control is the term describing a variety of possible control schemes, in particular open-loop-feedback control and limited-look-ahead-control.

predictive pyramid a limited amount of data is used to form a prediction image, and then the difference between the predicted image and the original image is used to form a residual image. This can then further be iterated to form a pyramid of residuals called the Laplacian pyramid.

predictive scalar quantization *See* differential pulse-code modulation.

predictive SQ *See* differential pulse-code modulation.

predictive vector quantization the generalization of scalar predictive coding to vector coding. *See* differential pulse-code modulation.

predictive VQ *See* differential pulse-code modulation.

predistorter predistortion type linearizer used to compensate the distortion component generating at high power amplifier (HPA). Since the predistorter adds the distortion component to the signal at 180 degrees out of phase, the distortion components, generated in predistorter and HPA, are canceled out at the output of the HPA.

prefetch *See* fetch policy.

prefetch queue in the CPU, a queue of instructions that has been prefetched prior to being needed by the CPU.

prefetching in the CPU, the act of fetching instructions prior to being needed by the CPU. *See also* fetch policy.

preformat information such as sector address, synchronization marks, servo marks, etc., embossed permanently on the optical disk substrate.

preincrementation an assembly language addressing mode in which the address is incremented prior to accessing the memory value. Used to access elements of arrays in memory.

preliminary breakdown an electrical discharge in the cloud that initiates a cloud-to-ground flash.

preprocessing a series of image enhancements and transformations performed to ease the subsequent image analysis process through, e.g., noise removal or feature extraction/enhancement.

pressure broadening spectral broadening of a transition in a laser medium due to elastic or inelastic collisions.

pressure vessel a steel tank which encloses the